REMARKS

Claims 1-10 are all the claims pending in the application. Claims 1 and 6 are independent claims. New dependent claims 8-10 have been added.

Formal Matters

Specification

The Specification is objected to by the Examiner. Specifically, the Examiner has objected to the Abstract of the Disclosure because the phrases "low level which are appeared repeatedly" and "ground fault is occurred" are unclear. Additionally, the Examiner has pointed to a minor typographical error in the specification.

In response, Applicant has deleted the abstract and has added a new abstract. Applicant has also corrected the minor typographical error.

Claims

Claims 1 and 7 are objected to because of informalities. In response, Applicant has amended these claims.

Moreover, Applicant has amended the last line of independent claims 1 and 6 to recite that the "integration interval has at least part of a high interval or a low interval of the pulse signal." This amended claim language is consistent with the exemplary embodiment shown in Figs. 3A and 3B, in whcih the integration interval T3 is only a part of the high level cycle T1. Moreover, it is consistent with the Detailed Description of the Preferred Embodiments section, which discloses that the integration interval is "at least part of a high-level interval or a low level interval of the pulse signal."

Allowable Subject Matter

Claim 5 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form. Applicant holds in abeyance the rewriting of this claim in independent form until the Examiner has had a chance to reconsider the rejection of independent claim 1.

Claim Rejections Under 35 U.S.C. § 103

Claims 1-4, 6 and 7 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Suzuki (2002/0121902 A1) in view of Engel (US 4,180,841).

Claim 1

With respect to independent claim 1, Applicant respectfully traverses the rejection at least because there is no combination of Suzuki and Engel that would reasonable teach or suggest all of the recitations of the claim. For example, the combination of Suzuki and Engel does not teach or suggest the claimed ground-fault detecting device having an integrator, integrating a difference between a first reference voltage and a detection voltage of the pulse signal at a connecting point of the detection resistor and the coupling capacitor over an integration interval.

Suzuki discloses a ground detection apparatus having a battery 31 (power source), a square wave output unit 14 (pulse signal generator), a detection resister 3, and a coupling capacitor 4.[2] An A/D converter 11 sequentially performs repeated sampling of voltages of a ground detection point A.

[2] *See* Suzuki at Fig. 2.

The Examiner acknowledges that Suzuki does not disclose the recited integrator. Therefore, the Examiner looks to the integrator 36 of Engel[3] in an attempt to make up for this deficiency.

However, the integrator 36 of Engel cannot correspond to the recited integrator at least because it does not integrate *a difference between a first reference voltage and a detection voltage of the pulse signal* at a connecting point of the detection resistor and the coupling capacitor over an integration interval. Instead, the integrator 36 of Engel merely integrates a current summation i_{sum} of a current αi_{in} and a current output i_{add} of the comparator 58.[4]

In Engel, a sensing winding 22 provides a current i_{in} to an amplifier 30. One output αi_{in} of the amplifier 30 is supplied to a summer 42, and another output Ki_{in} of the amplifier 30 is supplied to a comparator 58. The comparator 58 is also supplied with a reference current i_{ref}. When there is a ground fault, the integral of the summation i_{sum} will exceed a trip level produced by reference 47.[5]

Engel's integration is provided by detecting the voltage across an external capacitor C3. This is because the voltage across the capacitor is equal to the integral of the current.[6] Accordingly, although Engel's integrator 36 provides an integration of a current value i_{sum}, the integrator 36 does not a integrate *a difference* between a first reference voltage and a detection voltage of the pulse signal.

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[3] *See* Engel at Fig. 1.

[4] *See* Engel at Fig. 1 & 5:1-31.

[5] *See* Engel at Figs. 1 & 2(H & J).

[6] *See* Engel at Fig. 3 & 8:65-9:6.

In addition, it would not be possible to integrate a difference between two values by measuring the voltage across a capacitor.

Accordingly, Applicant respectfully requests that the Examiner withdraw the rejection of independent claim 1.

Claim 6

Applicant respectfully requests that the Examiner withdraw the rejection of independent claim 6 at least because the combination of Suzuki and Engel does not teach or suggest the claimed insulation resistance device having an integrator, integrating a difference between a first reference voltage and a detection voltage of the pulse signal at a connecting point of the detection resistor and the coupling capacitor over an integration interval, as is discussed above with respect to claim 1.

Claims 2-4 and 7

Applicant also respectfully requests that the Examiner withdraw the rejections of claims 2-4 and 7 at least because of their dependency from one of claim 1 and 6.

New Claims

Finally, Applicant has added new dependent claims 8-10 in order to provide additional claim coverage. New claim 8 includes the same recitations as allowed claim 5, but depends from claim 6.

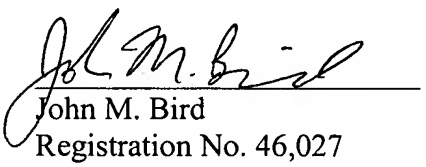
New claims 9 and 10 depend from claims 1 and 6 and recite some features of the integrator.

Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



John M. Bird
Registration No. 46,027

SUGHRUE MION, PLLC
Telephone: (202) 293-7060
Facsimile: (202) 293-7860

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